ALTERNATIVE #5 - Import Pipeline, Bismarck to Fargo

This is a Missouri River import alternative that supplies treated water from the Missouri River near Bismarck, to the Red River Valley near Fargo. Two variations of this model are presented here. The first variation (Alternative 5A1) uses import with ring dike re-regulation at both the Fargo site and the upper Red River supply at the Wahpeton site. The second variation (Alternative 5B) uses a single ring dike for re-regulation at the Fargo site only. Both variations of this alternative meet all of the projected 2050 Reclamation demands. Five features have been incorporated to make this alternative:

Feature 4 (modified) — Alternative 5A1 uses a pipeline bifurcation near Fargo with flow going to meet shortages through re-regulation ring dike reservoirs at both Fargo and Wahpeton. Alternative 5B uses a water-supply pipeline from *a ring-dike reservoir near Fargo* to the upper Red River near Wahpeton, with a branch to Abercrombie. The pipeline and its associated pumping plant provide water at 18 cfs to offset shortages at the existing Cargill plant and at New Industry 3 near Abercrombie.

Feature 5 (modified) —Both variations use ring dikes to allow for a steady rate import. Alternative 5A1 uses an 11,000 acre-foot ring dike re-regulation reservoir at Fargo and another 5,200 acre-foot ring dike re-regulation reservoir on the upper Red River at Wahpeton. Alternative 5B uses a 22,000 acre-foot ring-dike reservoir near Fargo to store and re-regulate water imported via the Bismarck-Fargo pipeline (feature 18).

Feature 12 — Conservation. This is about a 15-percent reduction in demand. However, it is offset by a 15- to 20-percent increase in demand during drought years.

Feature 17 — Surface-water supply for rural water systems. Cost estimates included here provide for multiple river diversions, treatment plants, pumping plants, and main supply pipelines. For modeling purposes, though, the rural system shortages are consolidated demand points located at Fargo and Grand Forks.

Feature 18 — Both variations of Alternative 5 include a biota treatment plant at Bismarck using the ozonation/chloramine process. Alternative 5A1 uses an import pipeline with 65 cfs capacity. Alternative 5B uses an import pipeline with a 70 cfs capacity.

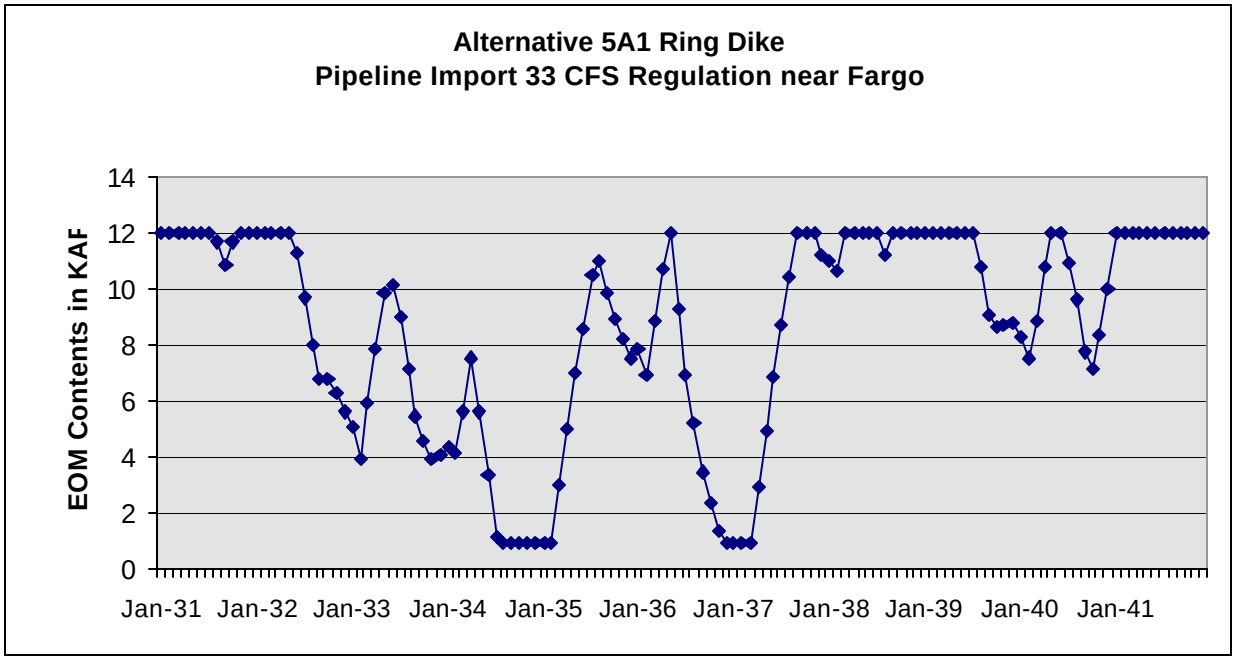
<u>Feature 4 Summary: Water Supply Pipeline to the Upper Red River</u>

The modification for this alternative is the ending point for this supply pipeline. At the terminal end of the Bismarck-Fargo Pipeline is a ring dike reservoir to be used to re-regulate the import flows. For Alternative 5A1 the ring dike is sized at 11,000 acre-foot and re-regulates an import of 33 cfs, with an additional 32 cfs tee to another 5,200 acre-foot re-regulating reservoir near Wahpeton.

For Alternative 5B the 70 cfs import pipeline terminates into a 22,000 acre-foot ring dike reservoir near Fargo. This pool of water is used as the pumping pool for the upper Red River pipeline supply. Costs for pumping from this pool include the pumping plant and the necessary length of pipeline to deliver 9 cfs to the New Industry 3 Abercrombie, and 9 cfs to the Cargill plant, without the use of a re-regulation reservoir at Wahpeton.

Feature 5 Summary: Ring Dike Reservoirs

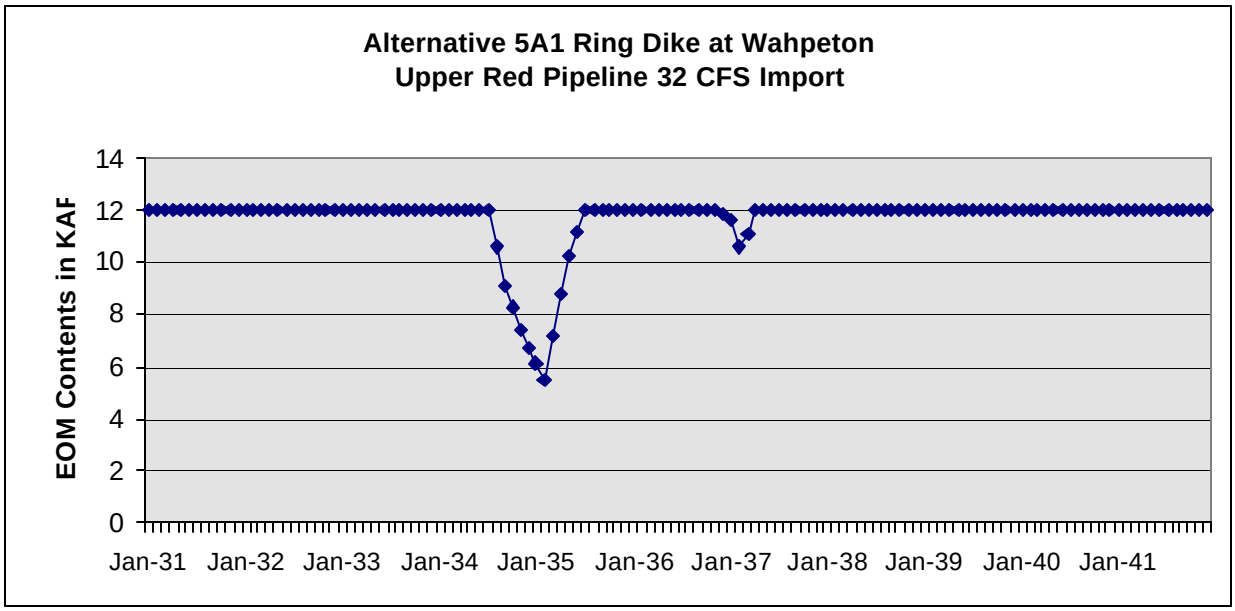
For Alternative 5A1, an 11,000 acre-foot ring dike is used at Fargo and a second ring dike is used at Wahpeton. These reservoirs are used to supply some peaking demands and allow the import pipeline to be sized down slightly and operate at a steady flow rate. Inflows to the Fargo ring dike is 33 cfs. Inflows to the Wahpeton ring dike is 32 cfs. The Wahpeton ring dike was modeled as an 11,000 acre-foot size reservoir, however, the graph showing the reservoir contents indicates that only about one half of the reservoir size was needed. Therefore, for cost estimating purposes, a ring dike reservoir of 5,200 ac-ft size has been used. These ring dikes are not used to capture any local river flows and therefore no diversion pumping plants are required.



For Alternative 5B, a 22,000-acre-foot ring-dike reservoir near Fargo is used to store and re-regulate water imported via the Bismarck-Fargo pipeline (70 cfs). The purpose of this reservoir is to provide for some peaking demands and allow the import pipeline to be sized down slightly and operate at a steady flow rate. Local river flows are not diverted and stored in this ring dike.

Feature 17 Summary: Rural Water Systems

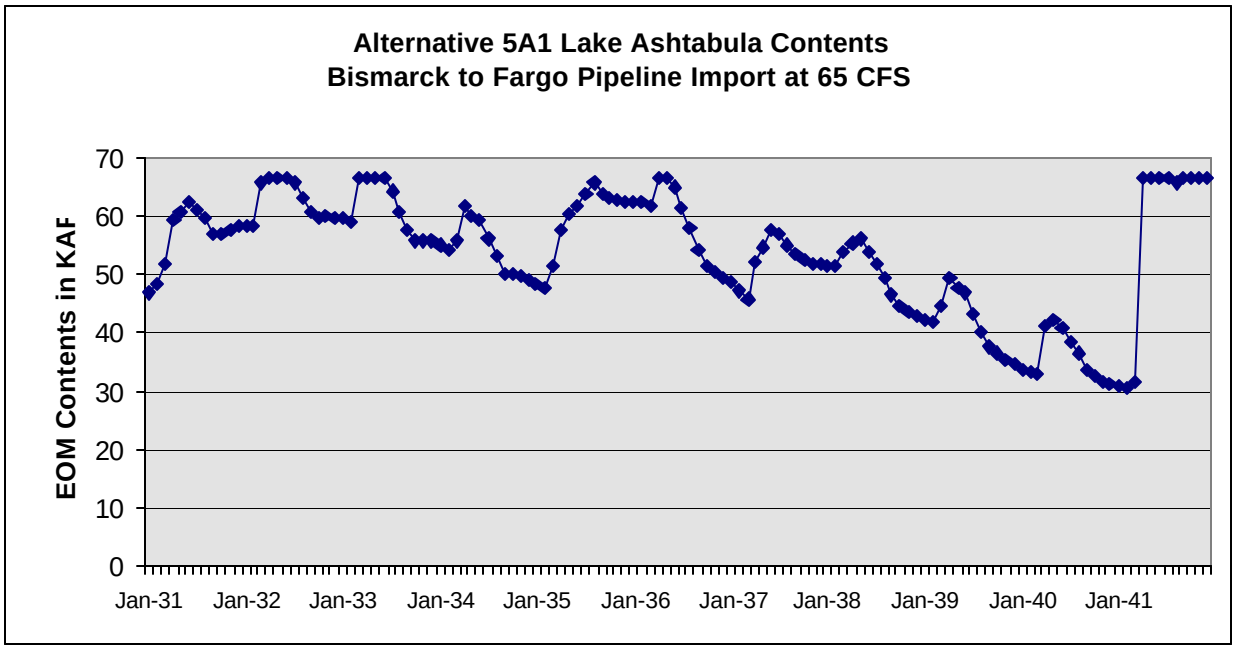
This feature includes an estimate for rural water diversions from the surface water supply, same as in Alternative 2.

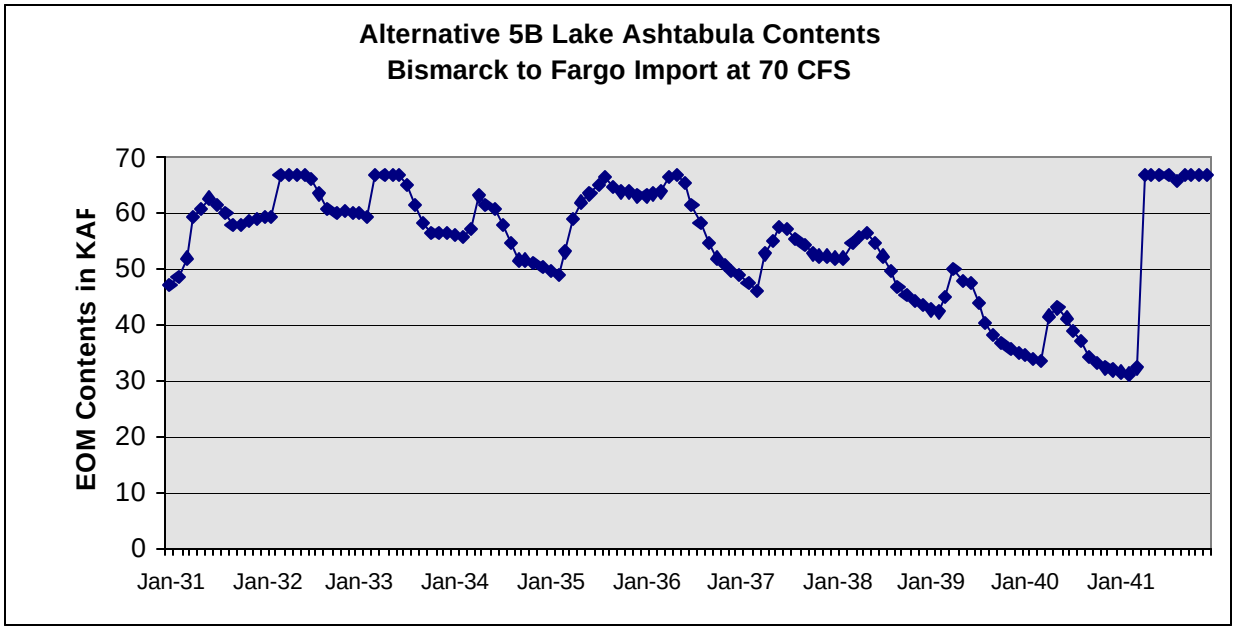


Feature 18 Summary: Bismarck to Fargo Import Pipeline

The basic features of this alternative are a pumping plant and supply pipeline from the Missouri River near Bismarck, to a ring dike reservoir near Fargo. A biota treatment plant would be located at the start of the pipeline near Bismarck. Biota treatment options considered include use of chlorine/chloramine process or a more expensive ozonation/chloramine processes. For this alternative, and all others using imported water, the ozonation/chloramine process has been used in the cost estimate. The pipeline would be used to meet base demands with water conserved in Lake Ashtabula to meet peak demands and other water right demands.

Lake Ashtabula end of month contents for 5A1 and 5B, and cost estimates are given on the following pages. Operations and maintenance costs are based on operating both the import pipeline and the biota treatment plant at a steady rate year-round.


Alternative 5A1 Lake Ashtabula Contents
Bismarck to Fargo Pipeline Import at 65 CFS
EOM Contents in KAF
70
60
50
40
30
20
10
0
Jan-31
Jan-32
Jan-33
Jan-34
Jan-35
Jan-36
Jan-37
Jan-38
Jan-39
Jan-40
Jan-41


Alternative 5B Lake Ashtabula Contents
Bismarck to Fargo Import at 70 CFS
EOM Contents in KAF
70
60
50
40
30
20
10
0
Jan-31
Jan-32
Jan-33
Jan-34
Jan-35
Jan-36
Jan-37
Jan-38
Jan-39
Jan-40
Jan-41

ESTIMATE WORKSHEET

ALTERNATIVE #5A1
Bismarck to Fargo
65 CFS Pipeline Import

PROJECT: RRV PHASE II
Red River Valley Water Supply

DIVISION:

FILE: ALT_COST.WK4

DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	LIFE	Annual Operation	Annual Maintenance	Annual Replacement	Annual Energy	TOTAL ANNUAL
Feature 4F											
Pumping Plant and Pipeline to upper Red River		18	cfs	LS	$69,000,000		$48,000	$12,800	$238,900	$71,300	$371,000
Feature 5											
Fargo Ring Dike Reservoir for Pipeline Regulation		10,600	Ac-Ft	LS	$17,810,000		$1,000		$8,600		$9,600
ROW and Relocations				LS	$1,160,000						
Wahpeton Ring Dike Reservoir for Pipeline Regulation		5,200	Ac-Ft	LS	$12,710,000		$1,000		$4,300		$5,300
ROW and Relocations				LS	$580,000						
Feature 17											
Agassiz, Tri County, Walsh Rural Diversion & Treatment Plant		0.785	MGD	LS	$18,499,000		$91,996	$4,028	$141,738	$113,795	$351,557
Cass Rural Water Diversion & Treatment Plant		2.628	MGD	LS	$20,735,000		$192,198	$9,802	$178,572	$274,570	$655,142
Dakota Rural Water Diversion & Treatment Plant		0.95	MGD	LS	$8,421,000		$125,464	$3,544	$119,185	$121,627	$369,820
Grand Forks Traill and Traill Diversion & Treatment Plant		2.86	MGD	LS	$19,338,000		$207,149	$10,760	$188,201	$300,241	$706,352
Langdon Rural Diversion & Treatment Plant		0.35	MGD	LS	$18,613,000		$62,002	$2,317	$128,546	$73,060	$265,924
Southeast and Ransom Sargent Diversion and Treatment Plant		1.3	MGD	LS	$19,079,000		$128,923	$6,374	$156,609	$169,391	$461,297
Feature 18											
Pumping Plant and Pipeline		65	cfs	LS	$463,000,000		$279,000	$90,000	$789,000	$1,917,000	$3,075,000
Biota Treatment Plant, Ozone		65	cfs	LS	$13,100,000		$980,000				$980,000
											$0
Water Treatment Chemical Cost Savings using Missouri River Water Supply :							($1,142,800)				($1,142,800)
						Subtotal	$973,933	$139,625	$1,953,650	$3,040,984	$6,108,191
										Unlisted Items'+/- 20%	$1,221,809
Existing GDU Supply Works, Continuing O&M										GDU Assigned Cost	$2,139,000
Mobilization (+/- 5%)					Included Above				**TOTAL ANNUAL OM&R**		**$9,470,000**
SUBTOTAL					$682,045,000						
Unlisted Items (+/- 20%)					Included Above						
CONTRACT COST					$682,045,000				**ANNUALIZED CAPITAL COST**		**$48,640,000**
Contingencies (+/- 25%)					Included Above						
FIELD COST					$682,045,000						
USBR Invest., Mitig., Engr. & Constr. Mgt. (+/- 33%)					Included Above				**TOTAL ANNUALIZED COST**		**$58,110,000**
TOTAL ESTIMATE					**$682,000,000**						

QUANTITIES		PRICES	
BY R. Burnett		**BY** K. Copeland	**CHECKED**
DATE	**APPROVED**	**DATE**	**PRICE LEVEL** Appraisal

ESTIMATE WORKSHEET

ALTERNATIVE #5B
Bismarck to Fargo
70 CFS Pipeline Import

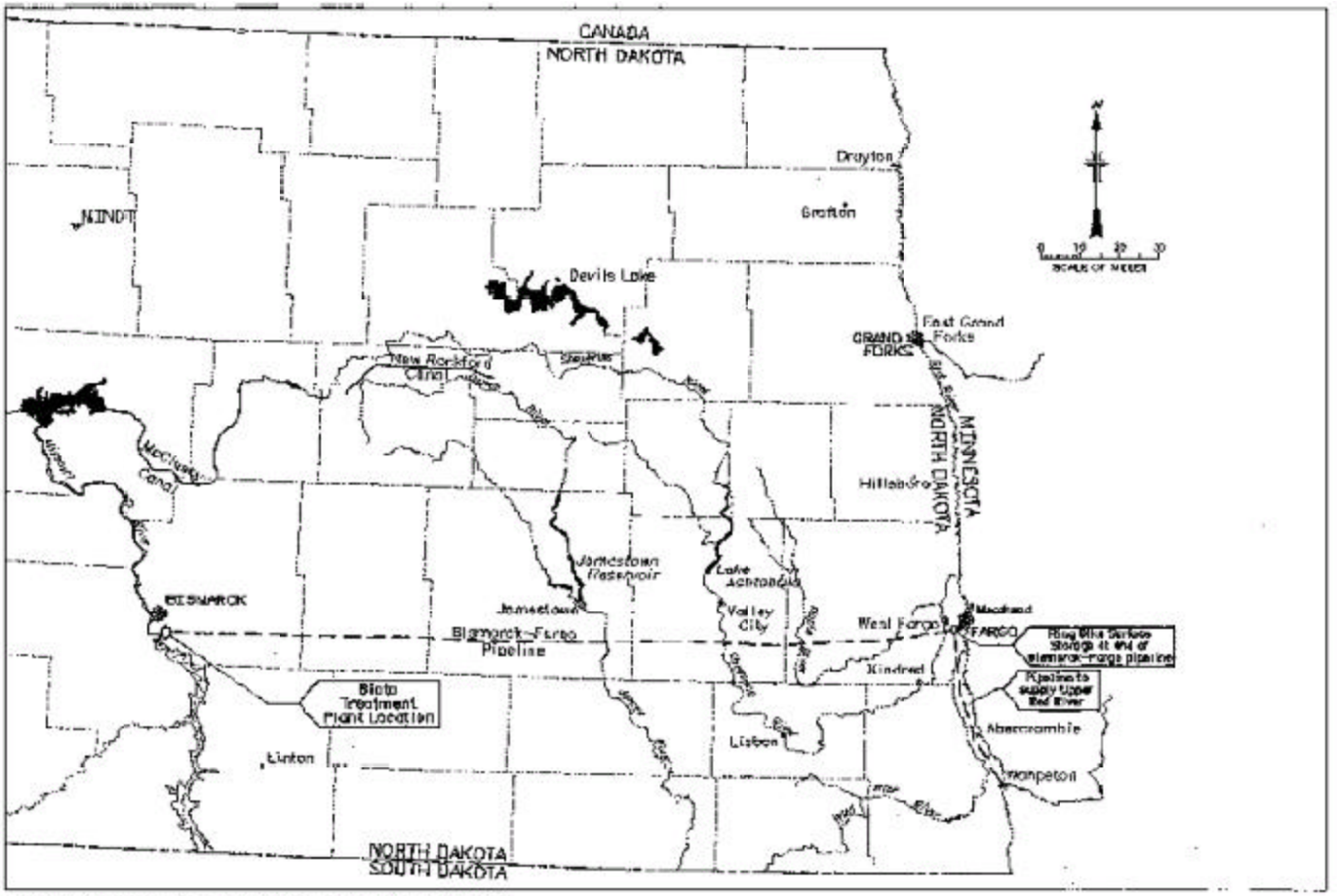
PROJECT: RRV PHASE II
Red River Valley Water Supply

DIVISION:

FILE: ALT_COST.WK4

DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	LIFE	Annual Operation	Annual Maintenance	Annual Replacement	Annual Energy	TOTAL ANNUAL
Feature 4F											
Pumping Plant and Pipeline to upper Red River		18	cfs	LS	$69,000,000		$48,000	$12,800	$238,900	$71,300	$371,000
Feature 5											
Ring Dike Reservoir for Pipeline Regulation		22,000	Ac-Ft	LS	$26,490,000		$1,000		$8,600		$9,600
ROW and Relocations				LS	$2,320,000						
Feature 17											
Agassiz, Tri County, Walsh Rural Diversion & Treatment Plant		0.785	MGD	LS	$18,499,000		$91,996	$4,028	$141,738	$113,795	$351,557
Cass Rural Water Diversion & Treatment Plant		2.628	MGD	LS	$20,735,000		$192,198	$9,802	$178,572	$274,570	$655,142
Dakota Rural Water Diversion & Treatment Plant		0.95	MGD	LS	$8,421,000		$125,464	$3,544	$119,185	$121,627	$369,820
Grand Forks Traill and Traill Diversion & Treatment Plant		2.86	MGD	LS	$19,338,000		$207,149	$10,760	$188,201	$300,241	$706,352
Langdon Rural Diversion & Treatment Plant		0.35	MGD	LS	$18,613,000		$62,002	$2,317	$128,546	$73,060	$265,924
Southeast and Ransom Sargent Diversion and Treatment Plant		1.3	MGD	LS	$19,079,000		$128,923	$6,374	$156,609	$169,391	$461,297
Feature 18											
Pumping Plant and Pipeline		70	cfs	LS	$490,000,000		$280,000	$94,000	$797,000	$2,060,000	$3,231,000
Biota Treatment Plant, Ozone		70	cfs	LS	$13,800,000		$1,050,000				$1,050,000
Water Treatment Cost Savings from using Missouri River Water Supply :											
						Subtotal	$2,186,733	$143,625	$1,957,350	$3,183,984	$7,471,691
										Unlisted Items '+/- 20%	$1,498,309
Existing GDU Supply Works, Continuing O&M										GDU Assigned Cost	$2,139,000
Mobilization (+/- 5%)					Included Above				**TOTAL ANNUAL OM&R**		**$11,110,000**
SUBTOTAL					$706,295,000						
Unlisted Items (+/- 20%)					Included Above						
CONTRACT COST					$706,295,000				**ANNUALIZED CAPITAL COST**		**$50,370,000**
Contingencies (+/- 25%)					Included Above						
FIELD COST					$706,295,000						
USBR Invest., Mitig., Engr. & Constr. Mgt. (+/- 33%)					Included Above				**TOTAL ANNUALIZED COST**		**$61,480,000**
TOTAL ESTIMATE					**$706,300,000**						

QUANTITIES		PRICES	
BY R. Burnett		**BY** K. Copeland	**CHECKED**
DATE	**APPROVED**	**DATE**	**PRICE LEVEL** Appraisal



ALTERNATIVE 5 – Pipeline Import to Fargo

Ring Dike on Red River near Fargo
-- Used to regulate pipeline import
Modified Thomas Acker Plan